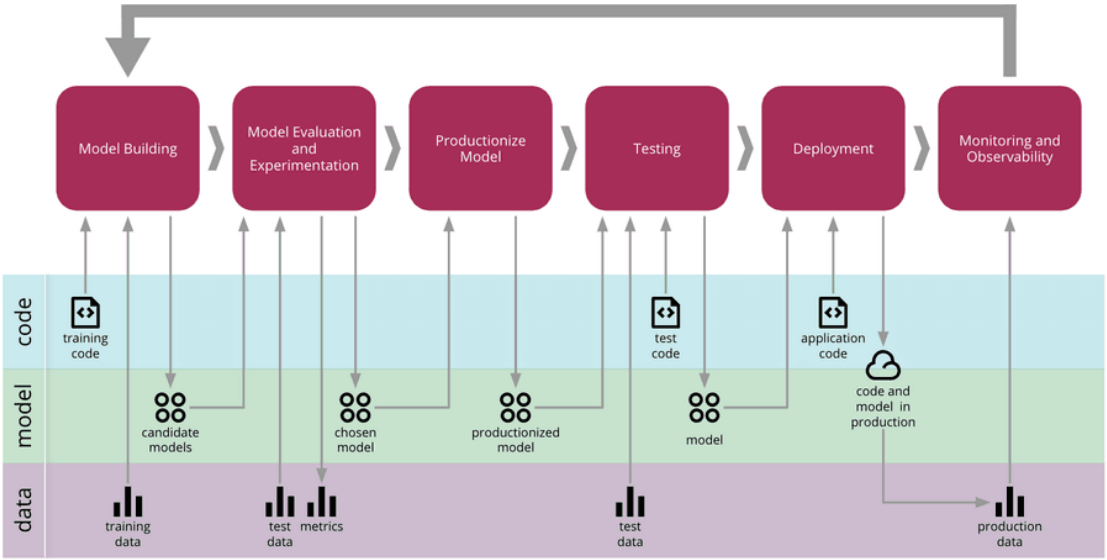
Session -9

ML - System Design -1

Oct 27, 2025

Agenda

* What does ML system design includes.



There are two metrics we track:

1. Offline-metric - MSE, RMSE, MAE, MAPE….
2. Online-metric - Things can go bad, A/B test conversion ratio, CTR…

Things to observe post deployment:

1. Online Accuracy metrics.
2. Latency shouldn't increase beyond expected limits.
3. Throughput - (Requests you server per second, this shouldn't decrease beyond certain threshold)
4. Cost
5. Server Load (Should be less than 50%)
6. Memory Usage (Should be less than 50%)

Which of these is NOT a system health/performance metric typically monitored after deploying an ML model?

0 users have participated

A	Requests per second	0%
B ✓	Accuracy of the model's predictions	0%
C	CPU/memory/data utilization	0%
D	Latency per request	0%

End Quiz Now

Based on all quizzes from the session

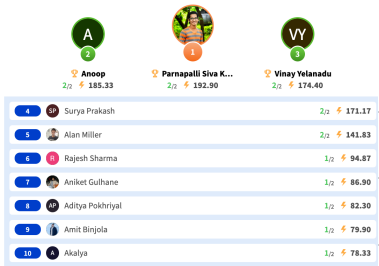
2	Anoop	1/1 92.13
1	Parnapalli Siva K...	1/1 94.03
3	Vinay Yelanadu	1/1 86.10
4	Surya Prakash	1/1 84.58
5	Akalya	1/1 78.33
6	Alan Miller	1/1 66.05

What is the purpose of the 'Model Evaluation and Experimentation' phase in the ML model lifecycle?

1 user has participated

A	Deploying the model to a production environment	0%
B	Preparing data and initial code formulation	0%
✓ C	Feature selection, hyperparameter tuning, and algorithm comparison	100%
D	Monitoring and observing the model in a live environment	0%

End Quiz Now



Drift in Model/Data

→ Something has changed → Target Features.

(1) Concept drift: properties of target has changed

(a.) Fraud detection

(c.) Work hours - Churn rate

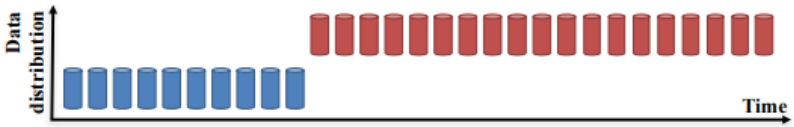
Soln: Train model with most recent data.

(2) Data drift: Properties of input Feature has changed.

(c.) Work hours - feature

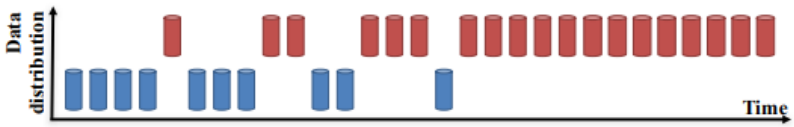
Soln: Create better features

Sudden Drift:



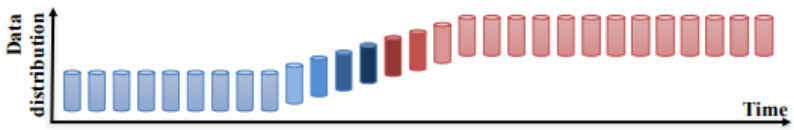
A new concept occurs within a short time.

Gradual Drift:



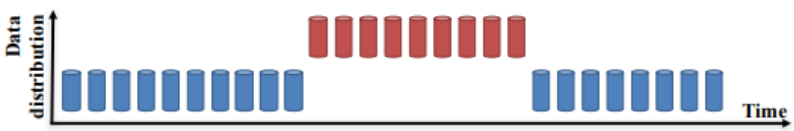
A new concept gradually replaces an old one over a period of time.

Incremental Drift:



An old concept incrementally changes to a new concept over a period of time.

Reoccurring Concepts:



An old concept may reoccur after some time.

How to Detect Drift

(1) Visual Inspection: Input data over time

(a) Distribution → μ, σ Current vs 6 month

(b) Plot data & see trend.

(2) Statistical test : For some column compare it with 6 months ago

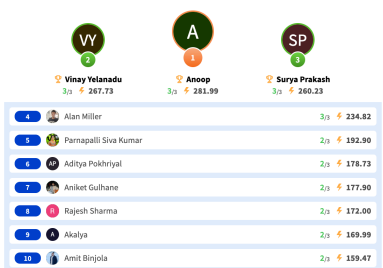
(3) Model performance metrics Key metrics over past 6 months

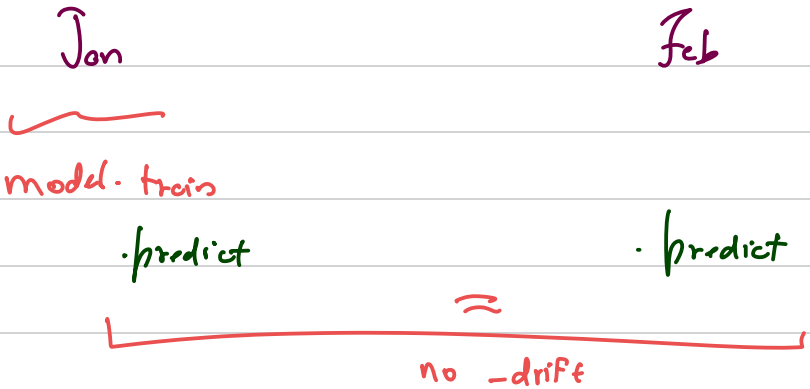
What is drift in the context of machine learning?

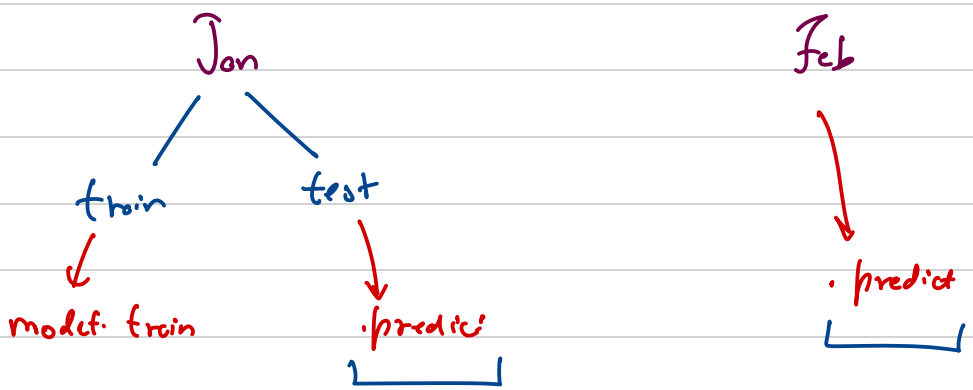
0 users have participated

A	The movement of an autonomous vehicle	0%
B	The physical displacement of a computing server	0%
C	The change in the statistical properties of model data over time	0%
D	The time it takes for a model to make a prediction	0%

End Quiz Now







What type of drift occurs when there's a change in the relationship between input data 'x' and output data 'y'?

0 users have participated

A	Data drift	0%
B	Business drift	0%
C	Algorithm drift	0%
D ✓	Concept drift	0%

End Quiz Now

Based on all quizzes from the session

2	Anoop	3/4 281.99
1	Alan Miller	4/4 307.42
3	Vinay Yelanadu	3/4 267.73
4	Surya Prakash	3/4 260.23
5	Amit Binjola	3/4 247.46
6	sarita Chauhan`	3/4 229.43
7	Parnapalli Siva Kumar	2/4 192.90
8	Aditya Pokhriyal	2/4 178.73
9	Aniket Gulhane	2/4 177.90
10	Rajesh Sharma	2/4 172.00

After observing changes in model metrics:

1. Check first if features have changed, their distribution.
2. If they've changed, you know the perp, other wise it's concept drift.